APPENDIX J

WATER QUALITY MONITORING MEMORANDUM

9645694

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TECHNICAL MEMORANDUM

To:	File	**Date:**	August 15, 2011
From:	Ben Roth, Anchor QEA	**Project:**	090557-01.02
Cc:			
Re:	TCRA Turbidity Monitoring Results – San Jacinto River Waste Pits Superfund Site		

This technical memorandum presents the turbidity monitoring results completed in February and March 2011, as part of the San Jacinto River Water Pits Superfund Site (SJRWP or Site) Time Critical Removal Action (TCRA). The monitoring adhered to the guidelines outlined in the Water Quality Monitoring Plan (WQMP), which is provided as Appendix F of Anchor QEA's, LLC (Anchor QEA) Removal Action Work Plan (RAWP), submitted in November 2010.

PURPOSE

The first turbidity monitoring event, which lasted from February 17, 2011 to February 23, 2011, was performed to fulfill the requirements of the TCRA at the Site Superfund Site. Specifically, as outlined by the WQMP, the purpose of the monitoring is to detect changes in water quality associated with the implementation of TCRA that could result in unacceptable exposure to human and ecological receptors or deposition of contaminated sediment outside the project area (Anchor QEA 2010).

The TCRA includes the following shoreline and in-water components (Anchor QEA 2010):

- Clear and grub areas where grading and/or the armored cap will be constructed.
- Install erosion control measures around the Site.
- Cut and fill materials on the Site to meet the design grades. The cutting and filling will occur primarily in the Western Cell.
- Install a separation geotextile over a majority of the Site where the armored cap is to be constructed.
- Construct the armored cap across the Site.

At the request of the U.S. Environmental Protection Agency (USEPA), Anchor QEA performed additional water quality monitoring during the in-water TCRA construction operations at the Site. The monitoring event lasted two days, from March 22, 2011 to March 23, 2011. Specifically, the intent of the monitoring was to capture the conditions during the tugboat and barge movement around the Site. These vessels are used to transport materials to the Site for the in-water construction of the items outlined above for the TCRA. The concern was that the propeller wash of these vessels would encourage increased turbidity, and thus adversely affect the water quality of the Site and surrounding waters.

WATER QUALITY MONITORING PROGRAM

The water quality monitoring program for both events adhered to the details outlined in the WQMP, which should be consulted for the complete monitoring program. Summarized briefly, the TCRA water quality monitoring program established:

- The monitoring parameter for turbidity as the nephelometric turbidity unit (NTU).
- 500-foot upstream and downstream compliance boundaries.
- Water quality monitoring criteria at the compliance boundaries:
    - Turbidity should not exceed 5 NTUs above background if background is less than 50 NTUs;
    - Turbidity should not exceed 10 percent above background if background is greater than 50 NTUs; and
    - Turbidity exceedances at the compliance boundary will trigger contingency response actions as described in the WQMP
- Background, compliance, and "early warning" monitoring station locations and depths.
- Intensive, routine, and limited monitoring frequencies and schedules.
- Responses to water quality exceedances at the "early warning" and compliance boundary stations.

Deviations to the program result from Site conditions during the two monitoring events. These alterations and their reasoning are described below.

Field modifications to monitoring locations were made based upon in-water construction activities and the resulting Site access limitations. Specifically, the "early warning" locations

were initially placed within the limits of the Eastern Cell (Figure 1). The aim of these locations was to capture the affects of the barges and tugboats on the Site's water quality; however, during the in-water activities, these locations were inaccessible. As a result, monitoring locations were adjusted to offset the appropriate distance from the vessels (i.e., 250 feet).

In order to verify the measurements taken in between the downstream compliance boundary (i.e., C-D) and the southernmost "early warning" station (i.e., E-D), a field verification was made halfway in between these locations. This station was created only for the first monitoring event. It was named station SJCD3 and is not shown on the attached maps or utilized for further Site monitoring. Additionally, the southernmost "early warning" station name has been altered in the attached figure and tables to SJCD2.

MONITORING METHODS

The water quality monitoring methods for both events adhered to the details outlined in the WQMP, which should be consulted for the complete list monitoring methods. Summarized briefly, the TCRA water quality monitoring methods established:

- The equipment necessary to ensure proper location and depth control,
- An appropriate measurement identification scheme,
- Necessary data to be collected at each station, and
- The calibration and maintenance anticipated for the monitoring equipment.

Deviations to the methods result from Site conditions during the two monitoring events. These alterations and their reasoning are described below.

As mentioned above, Site conditions during the monitoring events required that stations be moved an appropriate distance from in-water construction activities. The offset distances (i.e., 250 feet for "early warning" stations) were verified using a range finder. The offset targets were barges or tugboats operating within the in-water construction area of the Site.

RESULTS

The results from both monitoring events are provided in Table 1. All of the water quality background observations were below 50 NTUs; therefore, as indicated by the monitoring

program, the criterion applied to all observations at the compliance boundary is 5 NTUs above background.

As documented in the comments column of Table 1, initial exceedances were detected at SJ-E-U (2/21/2011 10:15 AM), SJ-E-C (3/22/2011 9:48 AM), SJ-E-U (3/22/2011 9:58 AM), SJ-E-U (3/23/2011 8:25 AM), and SJ-E-U (3/23/2011 10:08 AM). However, after the appropriate amount of time all of these initial exceedances were not confirmed, as the secondary readings were not above the established criterion of 5 NTUs above background.

Both monitoring events did not detect exceedances that trigger the contingency response actions outlined in the WQMP. Therefore, the observed data indicate that a "limited" monitoring frequency and schedule is appropriate for the duration of the in-water work performed for the TCRA (i.e., measurements of turbidity will only be taken if turbidity plumes are visually evident during in-water work).

REFERENCES

Anchor QEA, LLC, 2010. Final Removal Action Work Plan, San Jacinto River Waste Pits Superfund Site. Appendix F – Water Quality Monitoring Plan. Prepared for USEPA Region 6 on behalf of McGinnes Industrial Maintenance Corporation and International Paper Company. November 2010.

TABLES

Table 1

TCRA Turbidity Monitoring Results

Measurements are in Nephelometric Turbidity Units (NTU)

Date	Time	Monitoring Station							Comments
		SJ-B-U	SJ-C-U	SJ-E-U	SJ-E-C	SJ-C-D1	SJ-C-D2	SJ-B-D	
2/17/2011	9:15	(3 ft) 2.7 (7.5 ft) 3.6 (12 ft) 3.9							Pre-work background
2/17/2011	9:30		2.2						Pre-work background
2/17/2011	9:32			3.1					Pre-work background
2/17/2011	9:35				3.4				Pre-work background
2/17/2011	9:40						2.1		Pre-work background
2/17/2011	9:56					(24 ft) 4.6 (13.5 ft) 4.2 (3 ft) 3.5			Pre-work background
2/17/2011	10:00							(29 ft) 6.8 (14.5 ft) 5.1 (3 ft) 3.9	Pre-work background
2/17/2011	13:13	(12 ft) 3.8 (6 ft) 3.3 (3 ft) 3.2							1 hr after work initiated
2/17/2011	13:25			2.6					
2/17/2011	13:25				3.5				
2/17/2011	13:30						6.3		

Date	Time	Monitoring Station							Comments
		SJ-B-U	SJ-C-U	SJ-E-U	SJ-E-C	SJ-C-D1	SJ-C-D2	SJ-B-D	
2/17/2011	13:39					(24 ft) 10.5 (14 ft) 10 (3 ft) 8.4			Channel turbidity seems to have no correlation to work zone; supplemental sample taken closer to work zone shows that turbidity is lower closer to work zone.
2/17/2011	13:42							(29 ft) 8.7 (16 ft) 9.4 (3 ft) 6.1	
2/17/2011	13:50		(13 ft) 3.2 (8 ft) 3.6 (3 ft) 3.3						
2/17/2011	15:14	(12 ft) 2.8 (7.5 ft) 4.4 (3 ft) 5.0							
2/17/2011	15:25							(30 ft) 5.2 (16.5 ft) 5.1 (3 ft) 5.2	
2/17/2011	15:28					(25 ft) 5.4 (14 ft) 6.2 (3 ft) 5.1			
2/17/2011	15:31						7.5		
2/17/2011	15:34				6.8				
2/17/2011	15:37			5.7					
2/17/2011	15:40		(14 ft) 6.3 (8.5 ft) 6.9 (3 ft) 6.0						
2/18/2011	8:48	1.0							

Date	Time	Monitoring Station							Comments
		SJ-B-U	SJ-C-U	SJ-E-U	SJ-E-C	SJ-C-D1	SJ-C-D2	SJ-B-D	
2/18/2011	8:54		(10 ft) 6.0 (5 ft) 4.3 (3 ft) 3.8						
2/18/2011	9:08					(29 ft) 4.3 (16 ft) 4.5 (3 ft) 3.4			
2/18/2011	9:12							(34 ft) 4.4 (18.5 ft) 4.2 (3 ft) 3.4	
2/18/2011	10:07			2.0					
2/18/2011	10:10				3.2				
2/18/2011	10:14						3.2		
2/18/2011	12:35			1.5					
2/18/2011	12:37				2.4				
2/18/2011	12:45						7.3		
2/18/2011	15:21						1.9		
2/18/2011	15:24				2.1				
2/18/2011	15:27			7.4					Sampling area shallow and boat prop and monitor weight creating slight turbidity during monitoring
2/18/2011	15:34		(12 ft) 5.0 (7.5 ft) 5.0 (3 ft) 7.4						
2/21/2011	8:53	4.7							
2/21/2011	9:30		(14 ft) 3.6 (7 ft) 4.7 (3 ft) 4.8						

Date	Time	Monitoring Station							Comments
		SJ-B-U	SJ-C-U	SJ-E-U	SJ-E-C	SJ-C-D1	SJ-C-D2	SJ-B-D	
2/21/2011	9:13						(27 ft) 8.1 (15 ft) 8.3 (3 ft) 7.0		
2/21/2011	9:18							(34 ft) 9.5 (18 ft) 7.4 (3 ft) 6.9	
2/21/2011	10:00					7.2			
2/21/2011	10:03				8.4				
2/21/2011	10:03			9.9					Background 1,000 feet was 4.7 NTU. Will re-sample within 10 minutes (2 survey boats recently passed over monitoring location and it is very shallow. Suspect slight increase in turbidity is from boat traffic.)
2/21/2011	10:15			8.5					2nd sample at this location to confirm turbid sample is not related to in-water work. 2nd reading is within the 5 NTU background (background is 4.7 NTU).
2/21/2011	14:03							8	
2/21/2011	14:07				7.3				
2/21/2011	14:11			4.4					
2/22/2011	8:30	9.0							
2/22/2011	8:37							(34 ft) 3.6 (18.5 ft) 3.6 (3 ft) 3.5	
2/22/2011	8:45						4.6		

Date	Time	Monitoring Station							Comments
		SJ-B-U	SJ-C-U	SJ-E-U	SJ-E-C	SJ-C-D1	SJ-C-D2	SJ-B-D	
2/22/2011	8:48				5.0				
2/22/2011	8:48				5.0				
2/22/2011	8:51			5.2					
2/23/2011	11:20	4.9							
2/23/2011	11:39							(32 ft) 7.3 (16 ft) 7.3 (3 ft) 6.8	
2/23/2011	11:45			8.0					
2/23/2011	11:53				7.7				
2/23/2011	11:58						8.4		
3/22/2011	8:35	6.0 (9 ft) 6.2 (6 ft) 5.6 (3 ft)							Pre-work background
3/22/2011	8:54							8.4 (37 ft) 3.7 (20 ft) 3.5 (3 ft)	Pre-work background
3/22/2011	9:38						0.9		Barge departed at 9:35
3/22/2011	9:48				11.2 (initial) 8.8 (after 10 min)				Barge departed at 9:35; 2nd sample at this location to confirm turbid sample is not related to in-water work. 2nd reading is within the 5 NTU background (background is 3.5 - 8.4 NTU).
3/22/2011	9:58			12.5 (initial) 4.8 (after 10 min)					Barge departed at 9:35; 2nd sample at this location to confirm turbid sample is not related to in-water work. 2nd reading is within the 5 NTU background (background is 3.5

Date	Time	Monitoring Station							Comments
		SJ-B-U	SJ-C-U	SJ-E-U	SJ-E-C	SJ-C-D1	SJ-C-D2	SJ-B-D	
									- 8.4 NTU).
3/22/2011	12:00						5.7		Barge arrival to Site at 11:55
3/22/2011	12:04				4.1				Barge arrival to Site at 11:55
3/22/2011	12:09			5.3					Barge arrival to Site at 11:55
3/22/2011	13:46						1		Barge departed at 13:30
3/22/2011	13:50				2.3				Barge departed at 13:30
3/22/2011	13:53			4.6					Barge departed at 13:30
3/22/2011	15:52						0.8		Barge arrival to Site at 15:45
3/22/2011	15:57				1.9				Barge arrival to Site at 15:45
3/22/2011	16:00			3.4					Barge arrival to Site at 15:45
3/23/2011	7:30	4.9 (16 ft) 5.8 (9 ft) 5.3 (3 ft)							Pre-work background
3/23/2011	7:37							3.9 (33 ft) 4.4 (18 ft) 4.0 (3 ft)	Pre-work background
3/23/2011	8:16						5.7		Barge arrival to Site at 8:00
3/23/2011	8:20				5.6				Barge arrival to Site at 8:00
3/23/2011	8:25			25.9 (initial) 6.7 (after 10 min)					Barge arrival to Site at 8:00; 2nd sample at this location to confirm turbid sample is not related to in-water work. 2nd reading is within the 5 NTU background (background is 3.9 - 4.4 NTU).
3/23/2011	10:01						4.8		Barge departed at 9:50
3/23/2011	10:05				6.4				Barge departed at 9:50
3/23/2011	10:08			11.1 (initial)					Barge departed at 9:50; 2nd sample at this location to confirm turbid

Date	Time	Monitoring Station							Comments
		SJ-B-U	SJ-C-U	SJ-E-U	SJ-E-C	SJ-C-D1	SJ-C-D2	SJ-B-D	
				6.2 (after 10 min)					sample is not related to in-water work. 2nd reading is within the 5 NTU background (background is 3.9 - 4.4 NTU).
3/23/2011	12:13						6.4		Barge arrival to Site at 12:10
3/23/2011	12:16				6.4				Barge arrival to Site at 12:10
3/23/2011	12:20			7.9					Barge arrival to Site at 12:10
3/23/2011	14:01						3.7		Barge departed Site at 13:55
3/23/2011	14:04				3.8				Barge departed Site at 13:55
3/23/2011	14:08			4					Barge departed Site at 13:55

Notes:

1. Turbidity measurements are given in nephelometric turbidity units (NTU).
2. Where applicable, measurement depths are provided in parenthesis following the turbidity measurement.
3. Where applicable, initial and secondary measurements for a single station are provided.

FIGURES

Figure 1
Monitoring Stations
TCRA - Water Quality Monitoring
San Jacinto River Waste Pits Superfund Site